

TECHNICAL REPORT STANDARD TITLE PAGE

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15. Supplementary Notes					
16. Abstract Activities have included the completion of the field work on ground truth on mortality and defoliation; a helicopter overview and ground checking of delineated areas from ERTS-1 color composites, 7/21/72, of tree mortality and defoliated areas repeat aerial photos of sample areas in color and color IR at a scale of 1/5,000; completion of interpretation of defoliated areas. Conferences were held with personnel from NASA-Ames and two other ERTS-1 Investigators. Exhibits were set up and manned at the National Meeting of the Society of American Foresters. No 1973 ERTS-1 color composites have been received to date.					
17. Key Words (Selected by Author(s)) Ecology-Epidemiology-Forestry Interpretation Technique Development (Forest Insect)				18. Distribution Statement	
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Figure 2. Technical Report Standard Title Page

INTRODUCTION

This report covers activities for the period of June 1 through November 30, 1973 for the Investigation of the Detection and Monitoring of Forest Insect Infestations in the Sierra Nevada Mountains of California through the use of ERTS-1 imagery with support by U-2 and conventional aerial photography, Contract NAS5-21770; effective date June 21, 1972.

Activities during this period have included the completion of the field work on ground truth; a helicopter overview and ground checking of designated areas from ERTS-1 imagery of mortality and defoliated areas; repeat aerial photo coverage by our sub-contractor, Earth Satellite Corporation, of the same sample areas which were photographed about one year ago at a scale of 1/5,000; and completion of photo interpretation of defoliated areas from our only ERTS-1, NASA supplied color composites made from bands 4, 5 & 7, #1055-18055 for the Yosemite scene taken on September 16, 1972.

No ERTS-1 has been received for 1973, and we are therefore unable to make an evaluation or to monitor the infested areas. U-2 A-1 imagery was flown on June 29, 1973 but there was considerable delay in receipt and this was not received until October 6, 1973.

The Author participated in a Field Seminar by the Pacific Southwest Forest and Range Experiment Station in Yosemite National Park on July 26, 1973 and reported on "Detection and Monitoring of Forest Insect Infestations in Yosemite National Park through the use of ERTS-1 Imagery with U-2 and Conventional Aerial Photography." The Author and Dr. Phil Langley, one of our Cooperators from Earth Satellite Corporation, presented a program entitled

"The Use of ERTS-1 Imagery in Solving Some Forestry Problems", to the Clipper Club of the Orinda Community Church on October 18, 1973. The Author also set up and manned an exhibit at the National Meeting of the Society of American Foresters in Portland from September 23 through September 27, 1973.

Conferences were also held with several other ERTS-1 investigators and personnel from NASA-Ames, during this period.

GROUND TRUTH

Six additional mortality field plots were sampled in late July and early August, which completes this phase of the study. Dr. T. Koerber, our Cooperator from the Pacific Southwest Forest and Range Experiment Station, resampled all of the needle miner defoliated areas to assess the degree of foliage damage, and these data have been analyzed and evaluated.

HELICOPTER OVERVIEW

Our Cooperators from the U. S. Forest Service, Dr. Koerber and Robert Gustafson, made a helicopter flight over the target area to check, particularly, on the extent and degree of needle miner defoliation and to verify areas designated as defoliated from evaluation of ERTS-1 imagery. It was found that there was a high degree of agreement in the accuracy of the photo interpretation and visual observation from the helicopter flight.

GROUND CHECKING OF ERTS-1 IMAGERY

With our target area relatively free of snow in late July we had our first opportunity to field check our ERTS-1 imagery for various features delineated earlier on original and enlarged color composite photo-

graphs. We confirmed that the following features had been accurately designated: timbered vs non-timbered areas; damaged vs undamaged timber areas; pure lodgepole pine vs mountain hemlock; western white pine and red fir mixture; lakes; dome shadows which resemble lakes; mountain meadows; major stream courses; glaciers; pasture foothill land; agriculture land; desert; rock outcrops; and riparian vegetation. Three features not previously designated included: sage brush-bitterbrush vegetation type; pure Jeffrey pine type; and pinyon pine type.

UNDERFLIGHT SUPPORT

Repeat aerial photos of sample areas at a scale of 1/5,000 were taken and processed by our sub-contractor, Earth Satellite Corporation in late July 1973. These show that there has been no major changes in the mortality areas, but there has been some changes in the defoliated areas.

U-2, A-1 photo coverage with color IR was completed on June 29, 1973, but there was considerable delay in receipt of the transparencies until October 6, 1973, due to the first shipment being lost in the mail.

This U-2 imagery is being evaluated and is being compared with conventional 1/18,000 and we are greatly impressed with its resolution, and its potential for detecting insect damage. From this we can very precisely delineate areas of mortality and defoliation and are able to detect individual infested trees.

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CONFERENCES

A conference was held with Dr. John Tremore, from NASA-AMES concerning display material from California ERTS-1 Projects on significant results. The Author furnished him with two examples and has made arrangements to furnish him with a complete set at a later date.

Conferences were also held with two other ERTS-1 investigators, Dr. J. R. Shay and Dr. David Paine from Oregon State University at Corvallis, Oregon, concerning their success in detecting tussock moth defoliation from ERTS-1 imagery in Oregon and Washington. Their results to date have been negative.

EXHIBITS

The Author set up and manned an exhibit with illustrative photos of accomplishment in 1972 in detecting forest insect damage, at the National Meeting of The Society of American Foresters in Portland, Oregon, from September 23 through September 27, 1973.

SIGNIFICANT RESULTS

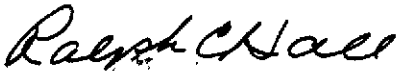
In our earlier reports we have indicated that it is possible to delineate areas of lodgepole pine timber mortality into three degrees of damage from enlarged ERTS-1 color composites; light, medium and heavy. During this reporting period we can confidently report that it is now possible to detect all major areas of lodgepole pine defoliated by the needle miner.

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We have confirmed, through ground checking and helicopter observation that our previous designation of the following features have been consistently accurate: timbered vs non-timbered areas; timber types; damaged vs undamaged areas; lakes, dome shadows which resemble lakes, mountain meadows, pasture and agricultural land, desert; riparian vegetation; and glaciers.

Respectfully submitted,

NATURAL RESOURCES MANAGEMENT CORPORATION



Ralph C. Hall
Principal Investigator

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